



SEA GRANT CONTRIBUTIONS TO THE NATION IN

MARINE AND AQUATIC SCIENCE LITERACY

EDUCATING THE 21ST CENTURY WORKFORCE

The goal of the Sea Grant Marine and Aquatic Science Literacy Initiative is to educate future environmental professionals and leaders and to enhance marine and aquatic literacy among the general public of the United States. Sea Grant seeks to partner with other national education efforts, including NSF's Centers for Ocean Science Education Excellence, the Consortium for Oceanographic Research and Education, the National Oceanographic Partnership Program, the National Marine Educators Association and educators within NOAA line offices. The Sea Grant Educators Network operates both locally and as a national force, providing highly respected marine and aquatic science education programming nationwide.

Sea Grant Produces National Benefits

Recent investments in Sea Grant marine and aquatic science literacy program has resulted in the following outcomes:

- Sea Grant is a major partner in the Central Coordination Office and in five of seven regional Centers of Ocean Science Education Excellence (COSEE) recently funded by the NSF with support from NOAA. These centers will serve as catalysts and points of contact for educators and researchers interested in improving and expanding ocean sciences education around the country.
- Sea Grant initiated an education program for the more than one million visitors who come to swim and snorkel in Hanauma Bay, Oahu each year. Partnering with the City of Honolulu, the education program provides information on coral reef ecology, snorkeling and SCUBA diving etiquette. Aimed at mitigating damage to the coral reef by visitors, the program also fosters a sense of stewardship. The success of the Hanauma Bay education program recently stimulated the City of Honolulu to build a state-of-the-art education and interpretation center to enhance education about Hawaii's coral reefs.
- A curriculum using *Water on the Web* was developed by Sea Grant; it teaches high school and community college students basic science concepts through the use of real-time remote sensing technology and Geographic Information Systems software. Thousands of students have been exposed to the curriculum and have conducted interactive scientific inquiries using classroom computers connected via cellular phone to programmable underwater sampling "robots" located in several Minnesota lakes. The program is now going national so that students can compare lake conditions in different parts of the country.
- The Exotic Species Day Camp Project and ESCAPE Collection of Classroom Activities are the outcome of five Great Lakes Sea Grant Network training sessions involving several hundred classroom teachers and informal educators. The result of the workshops is ESCAPE, a collection of 36 hands-on multidisciplinary activities that have enhanced existing curriculum in biology and environmental sciences. The inquiry based lessons have helped students understand aquatic nuisance species impacts on ecosystems and have allowed youth to explore potential solutions to problems caused by aquatic nuisance species. The project has been recognized as a superior program through three national awards, including the American Distance Education Consortium Outstanding Educational Program Award.
- Over the past 10 years Sea Grant has addressed the national need for comprehensive information on careers in the marine sciences. There are some 40,000 copies of *Marine Science Careers* in circulation across the country and around the world. A feedback loop on marinecareers.net has resulted in hundreds of e-mails from users in 49 U.S. states and 34 foreign countries on six continents.
- The Bridge Web Site is a growing collection of the best marine education resources available on-line. It provides K-12 educators with a convenient source of accurate and useful information on global, national and regional marine science topics; supports researchers in educational outreach efforts; and improves communications among educators and between the education and research communities.
- Sea Grant pioneered the first U.S. program to train volunteers to conduct sampling and analysis for a range of coastal water quality indicators. In doing so Sea Grant demonstrated that volunteers not only provide valuable, management-critical monitoring data, but the volunteers also become much better informed regarding the science and management of coastal environmental monitoring.
- Exotic Aquatics on the Move is a Sea Grant National Strategic initiative in education. At the initial geography standards-based workshops, 77 geography, social studies and environmental science teachers from five states learned about aquatic nuisance species (ANS)

from Sea Grant researchers and outreach specialists. They have now incorporated their hands-on experience into their classrooms using quality interactive education products and hundreds of free instructional materials on exotic aquatic species and their origin, distribution, spread and impact. More than 5,000 students have learned about the importance of ANS and how they can be involved in helping prevent their spread. Teachers developed 29 new classroom lessons that are available on a CD-Rom and are aligned with National Geography Education standards.

- Sea Grant treated students and the public to a virtual trip as they followed marine scientists on a scientific voyage to the ocean's depths. "Extreme 2000: Voyage to the Deep" – was developed in partnership with an NSF-funded dive in Alvin. A resource guide about the deep sea, a half-hour classroom instructional video produced by PBS, and an interactive Web site (www.ocean.udel.edu/deepsea) highlighting hydrothermal vents and their unique life were developed. During the expedition, a live conference call, journals, video clips, and photos were relayed back to shore by the scientists on a daily basis and uploaded to the Web site so that visitors could

share the excitement of scientific discovery. Subsequent projects "Extreme 2001: A Deep-Sea Odyssey" <http://www.ocean.udel.edu/extreme2001/> and "Extreme 2002: "Mission to the Abyss" <http://www.ocean.udel.edu/extreme2002/> had *world-wide* participation.

- Joining the emerging field of biotechnology with a broad interest in marine science, Sea Grant has offered training and hands-on education to thousands of students, many of them from the inner city, at the world-class Center of Marine Biotechnology in Baltimore. Here students are exposed to molecular biology, genetics and engaging marine topics, such as biofouling. This innovative program uses aquaculture as a platform to teach a wide range of science topics and has been implemented by providing professional development to teachers on how to build and operate fully functional classroom scale aquaculture systems.
- Improving the public's science literacy is the hallmark of Sea Grant's "Earthwatch Radio," the longest-running program on science and the environment on radio today. Conceived shortly after the first Earth Day in 1970 and produced with support from the Gaylord Nelson Institute for Environmental Studies, "Earthwatch" also provides

employment and professional science writing experience for students. Named to the United Nations Environment Programme's Global 500 Honor Roll in 1992, "Earthwatch" presently can be heard on more than 125 U.S. radio stations, the international Armed Forces Radio & Television Services network and the "Earthwatch Radio" Web site (ewradio.org).

Building the Future on Successes of the Past

Sea Grant will continue to foster partnerships and collaborations that will complement ongoing and emerging federal efforts. Such activities will increase public knowledge about and understanding of the scientific processes and issues related to marine and aquatic areas. In addition, a well-educated and diverse workforce attuned to the science and issues pertinent to marine and aquatic areas will emerge.



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